Does smoking impact trust in physicians and satisfaction with the health system in China?

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ABSTRACT

INTRODUCTION Trust and satisfaction play vital roles in how smokers react to smoking cessation treatment delivered by physicians. This paper aims to ascertain whether smoking status and pack-years of smoking affect trust in physicians and satisfaction with the health system in China.

METHODS The current study used the ordered probit model to evaluate how smoking status affects trust in physicians and satisfaction with the health system in China. Data from the China Family Panel Studies (CFPS) 2018 were used for the analysis, and the final sample consisted of 29500 adults. The CFPS is a nationally representative, comprehensive, high-quality, biennial longitudinal survey of Chinese communities, families, and individuals. The survey was conducted in 25 provinces and their administrative equivalents. The population of 25 provinces represents 95% of the total population in Mainland China.

RESULTS According to the ordered probit model, the results showed that current smokers were significantly negatively associated with trust in physicians, and more cigarette smoking was associated with decreased trust in physicians. Moreover, current smokers were also significantly negatively related to satisfaction with the health system.

CONCLUSIONS The present study found that current smokers would be more likely to rate trust in physicians lower, and less likely to rate greater satisfaction with the health system, than never smokers. These results may have important implications for regaining trust in physicians from smokers and supporting health-system reform for tobacco treatment.

INTRODUCTION

In 2018, an estimated 26.6% of Chinese adults were current smokers, more in men (50.5%) than in women (2.1%), implying that the number of current smokers was more than 300 million[1]. Even though smoking has proven to be a significant cause of diseases such as cardiovascular disease, chronic obstructive lung disease, and lung cancer, only 19.8% of current smokers tried to quit smoking within one year. Among those people, 8.4 % of smokers used pharmacotherapies and counseling for smoking cessation[1,2]. Trust and satisfaction play essential roles in how smokers react to smoking cessation treatment delivered by physicians[3,4]. Trust in physicians increases healthcare utilization[5]. Increasing patient trust of physicians is likely to increase the use of preventive services[6]. Moreover, patient satisfaction is significantly associated with the performance of preventive

services[7]. Therefore, it is necessary to examine trust in physicians and satisfaction in healthcare among smokers to promote smokers' utilization of preventive care and adherence to prescribed care.

Although previous studies have analyzed the relationship between smoking status and trust, the relationship between smoking status and trust is complicated. Rural Medicaid-insured smokers have a high level of trust in their healthcare provider[8]. Smokers have a significantly higher level of trust in cancer information obtained from their physicians[9]. Interestingly, some studies found that current smokers report a low level of trust in physicians than never smokers[10], and daily smokers are less likely to trust physicians compared to never smokers[11,12]. In addition, lower satisfaction with healthcare providers is associated with being a current smoker[13], but smokers who receive smoking cessation treatment are associated with higher satisfaction with their healthcare[14,15].

As the above relationship has not been examined in China, a national survey was used to ascertain trust in physicians and satisfaction with the health system among Chinese smokers. This paper aims to ascertain whether smoking status and pack-years of smoking affect trust in physicians and satisfaction with the health system in China.

METHODS
Data source
The data used in this study were obtained from the China Family Panel Studies 2018 (CFPS 2018), launched by the Institute of Social Science Survey of Peking University. The CFPS is a nationally representative, comprehensive, high-quality, biennial longitudinal survey of Chinese communities, families, and individuals. The survey was conducted in 25 provinces and their administrative equivalents. The population of 25 provinces represents 95% of the total population in Mainland China. The CFPS uses multistage probability proportional-to-size sampling and includes community, family, adult, and child, questionnaires. The CFPS implemented the first wave survey in 2010 and four waves of full sample follow-up surveys in 2012, 2014, 2016, and 2018. A detailed description of the CFPS is provided in previous studies[16,17]. The CFPS 2018 included 32539 adults aged ≥15 years. Only adults who completed

the questionnaire by themselves were selected from the dataset, and the final sample consisted of 29500 adults.

Measures
Trust in physicians characterizes a relationship between the patient and his/her physician. However, unlike in many developed countries, the idea of 'my physician' is somewhat unusual among Chinese people due to the lack of contracted family physicians in the primary care system. General trust in physicians was set as an ordinal dependent variable with eleven response categories based on a CPFS question asking respondents to indicate their overall trust in physicians on a scale from 0 (completely distrustful) to 10 (completely trustworthy).

Satisfaction with the health system was also set as an ordinal dependent variable. This variable takes values between 0 and 10; with 0 completely unsatisfied, and 10 completely satisfied. The CFPS question evaluating this variable was: 'How would you rate the severity of China's healthcare problem?'; with 0 'least severe', and 10 'most severe'. The severity score for the healthcare problem measures public satisfaction with the health system[18]. The current study recoded the value of 10 for 'most severe' to 0 for 'completely unsatisfied'; and 0 for 'least severe' to 10 for 'completely satisfied'.

All respondents were divided into three mutually exclusive smoking-status groups based on the last wave of the CFPS: non-smokers, current smokers, and ex-smokers. The CFPS 2018 question asked: 'Have you smoked in the past month?'. Responses were 'Yes' or 'No'. If the respondent answered 'Yes', the respondent was categorized as a current smoker. The respondent who answered 'No' was then asked: 'Have you ever smoked?'. Responses were 'Yes' or 'No'. If the respondent answered 'Yes', the respondent was considered as an ex-smoker. If the respondent answered 'No' to both questions, the respondent was categorized as a non-smoker. Moreover, all current smokers reported the number of cigarettes smoked per day and the number of years of smoking. Pack-years of smoking were then calculated by multiplying the number of packs of cigarettes smoked per day by the number of years of smoking; ex-smokers and non-smokers were assigned a score of 0.

The control variables were selected based on a literature review to identify factors that may affect

public trust in physicians and satisfaction with the health system. These variables were classified into the following four categories: 1) sociodemographic characteristics such as age, sex, educational level, marital status, urban residency, medical insurance, household income, and employment; 2) health status, self-rated health and smoking-related chronic conditions; 3) drinking; and 4) healthcare utilization.

An adult with smoking-related chronic diseases was defined as a respondent who self-reported to have been diagnosed with cancer, cardiovascular disease, lung diseases and/or diabetes between 2010 and 2018

based on five waves of data from the CFPS. Healthcare utilization was set as a dummy variable equal to 1 if the individual self-reported being hospitalized in the past 12 months and 0 otherwise, based on the CFPS question: 'Have you been hospitalized in the past twelve months?'. In empirical modeling, to capture differences in frequency of visits, inpatient-care utilization can be used as a proxy. Table 1 describes all the variables in this study.

Statistical analysis

To detect smoking status affecting trust in physicians

Table 1. Definitions of variables, evaluations, and sociodemographic characteristics, China Family Panel Studies 2018 (N=29500)

Variables	Description	Mean (SD) or %
Dependent variables		
TIP	Trust in physicians. An ordinal variable with eleven response categories from 0 (completely distrustful) to 10 (completely trustworthy)	6.74 (2.38)
SHS	Satisfaction with the health system. An ordinal variable with five response categories from 0 (completely unsatisfied) to 10 (completely satisfied)	3.34 (2.70)
Independent variables		
Smoking status		
Current smoker	Coded: 1 if the individual currently smokes cigarettes; 0 otherwise	28.81
Ex-smoker	Coded: 1 if the individual has quit smoking; 0 otherwise	2.28
Never smoker	Coded: 1 if the individual has never smoked; 0 otherwise	68.91
Pack-years	One pack-year is 20 cigarettes smoked per day for one year	11.19 (24.90)
Age (years)		
15–24	Coded: 1 if the individual is aged 15–24 years; 0 otherwise	10.97
25–64	Coded: 1 if the individual is aged 25–64 years; 0 otherwise	71.96
≥65	Coded: 1 if the individual is aged ≥65 years; 0 otherwise	17.07
Male	Coded: 1 if the individual is male; 0 for female	49.57
Educational level		
Illiterate	Coded: 1 if the individual is illiterate or semi-literate; 0 otherwise	21.77
Elementary school	Coded: 1 if the individual attends elementary school; 0 otherwise	19.78
Middle school	Coded: 1 if the individual graduated only from middle school; 0 otherwise	29.93
High school	Coded: 1 if the individual graduated only from high school; 0 otherwise	16.24
Above three-year college	1 if the individual graduated from above three-year college; 0 otherwise	12.29
Married	Coded: 1 if the individual is married; 0 otherwise	78.49
Urban residency	Coded: 1 if the individual is an urban resident; 0 for a rural resident	50.48
Medical insurance		
GMI	Coded: 1 if the individual has Government Medical Insurance; 0 otherwise	2.34
UEMI	Coded: 1 if the individual has Urban Employee Medical Insurance; 0 otherwise	14.57
URMI	Coded: 1 if the individual has Urban Resident Medical Insurance; 0 otherwise	8.49
NRCMI	Coded: 1 if the individual has New Rural Cooperative Medical Insurance; 0 otherwise	65.16
SI	Coded: 1 if the individual has supplementary medical insurance; 0 otherwise	0.44
NoI	Coded: 1 if the individual does not have medical insurance; 0 otherwise	11.34

Table 1. Continued

Variables	Description	Mean (SD) or %
Household income	Net household income (×10000 RMB)	6.20 (7.58)
Employment		
Agricultural	Coded: 1 if the individual works in agriculture; 0 otherwise	31.85
Waged	Coded: 1 if the individual has an employer; 0 otherwise	34.13
Self-employed	Coded: 1 if the individual works for himself/herself; 0 otherwise	8.34
Other	Coded: 1 if the individual is a temporary worker, retired, unemployed, or student; 0 otherwise	25.67
Health status		
Poor	Coded: 1 if the individual reports health status to be poor; 0 otherwise	16.29
Fair	Coded: 1 if the individual reports health status to be fair; 0 otherwise	13.09
Good	Coded: 1 if the individual reports health status to be good, very good, or excellent; 0 otherwise	70.62
Smoking-related chronic diseases	Coded: 1 if the individual has had doctor-diagnosed smoking-related chronic diseases; 0 otherwise	16.78
Drinking	Coded: 1 if the individual reports drinking alcohol at least three times a week in the past month; 0 otherwise	14.90
Healthcare utilization	Coded: 1 if the individual is hospitalized in the past twelve months; 0 otherwise	13.11

RMB: 1000 Chinese Renminbi about 150 US$.

in China, the current study used the ordered probit model. The ordered probit model is based on a latent regression and is defined as follows:

$$y^* = x'a + \varepsilon$$

where x' is a vector of independent variables including smoking status or pack-years of smoking, sociodemographic characteristics, health status, drinking, and healthcare utilization, a is the coefficient vector, y^* is an unobserved latent variable linked to the observed ordinal response categories of 'Trust in physicians' (TIP):

$$TIP = \begin{bmatrix} 0, & if\ y^* \le \mu_0 \\ 1, & if\ \mu_0 < y^* \le \mu_1 \\ & \cdot \\ & \cdot \\ & \cdot \\ 9, & if\ \mu_8 < y^* \le \mu_9 \\ 10, & if\ \mu_9 < y^* \end{bmatrix}$$

The unknown parameter μ is to be estimated with a. We assume that ε is normally distributed across observations and normalize the mean and variance of ε to 0 and 1, respectively. We then have the following probabilities:

$$Prob(TIP=0 \mid x) = \Phi(-x'\beta)$$
$$Prob(TIP=1 \mid x) = \Phi(u_1 - x'\beta) - \Phi(-x'\beta)$$
$$\vdots$$
$$Prob(TIP=10 \mid x) = 1 - \Phi(u_9 - x'\beta)$$

In order for all the probabilities to be positive, we must have $0 < u_1 < u_2 < \cdots < u_9$. The ordered probit model was estimated using maximum likelihood in the statistical software package STATA 14.0. The present study also employed the ordered probit model to explore smoking status affecting satisfaction with the health system in China.

RESULTS

Table 1 reports the characteristics of the sample. Nearly 30% of the study population were current smokers. Only about 2% of the study population were ex-smokers. The mean trust score and satisfaction score were 6.74 and 3.34, respectively. Figure 1 presents the mean trust score and satisfaction score by smoking status. Compared to never smokers and ex-smokers, current smokers had a low level of trust in physicians and low satisfaction with the health system. One-way ANOVA showed significant differences in trust in physicians across smoking status. However, there were no significant satisfaction differences across smoking status.

Figure 1. The mean trust score and satisfaction score by smoking status
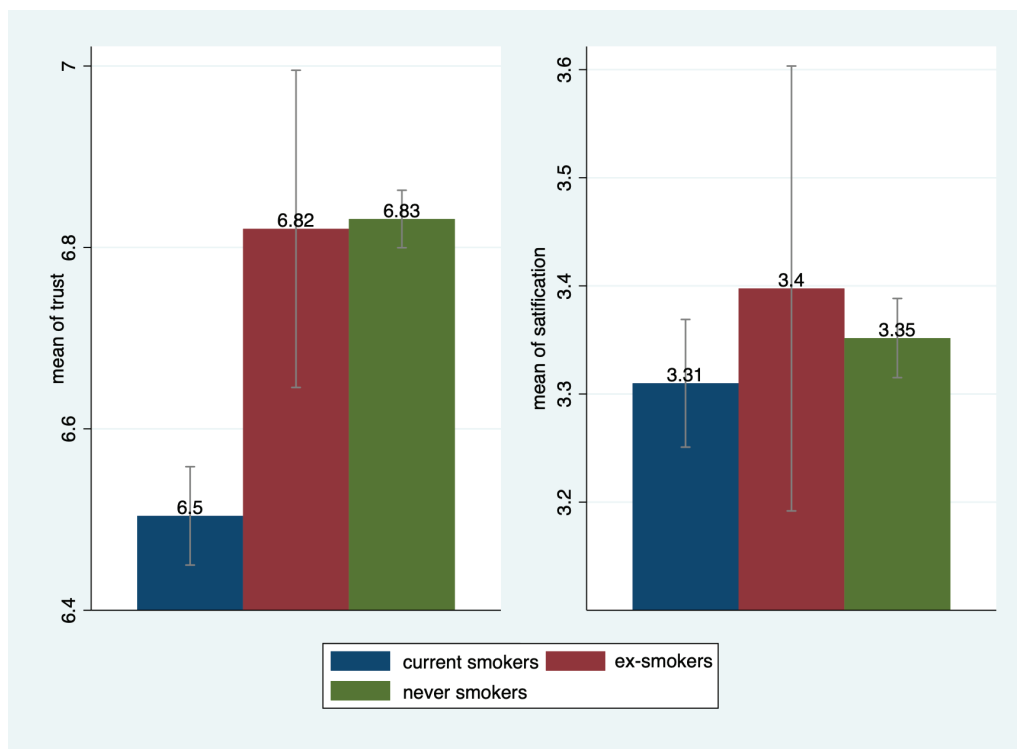
Note: p=0.0000 (one-way ANOVA on the relationship between smoking status and trust); p=0.4173 (one-way ANOVA on the relationship between smoking status and satisfaction). The error bars in the graph represent the 95% confidence interval for each smoking-status group.

Table 2. Ordered probit regression analysis on trust in physicians

Variable	Model 1		Model 2	
	(i)	*(ii)*	*(iii)*	*(iv)*
	Coefficient (95% CI)	SE	Coefficient (95% CI)	SE
Smoking status				
Current smoker	-0.0609** (-0.0938, -0.0280)	0.0168	–	
Ex-smoker	0.0470 (-0.0334, 0.1280)	0.0411	–	
Never smoker	Ref.		–	
Pack-years	–		-0.000974** (-0.001510, -0.000439)	0.000273
Age				
15–24	Ref.		Ref.	
25–64	-0.1590** (-0.2080, -0.1100)	0.0251	-0.1580** (-0.2070, -0.1090)	0.0251
≥65	-0.0273 (-0.0845, 0.0298)	0.0292	-0.0218 (-0.0792, 0.0356)	0.0293
Male	-0.0692** (-0.0998, -0.0386)	0.0156	-0.0792** (-0.107, -0.0518)	
Educational level				
Illiterate	Ref.		Ref.	
Elementary school	-0.0902** (-0.1280, -0.0523)	0.0193	-0.0887** (-0.1270, -0.0508)	0.0193
Middle school	-0.1020** (-0.1390, -0.0643)	0.0192	-0.1020** (-0.1390, -0.0642)	0.0192
High school	-0.1090** (-0.1540, -0.0636)	0.0231	-0.1090** (-0.1540, -0.0636)	0.0231
Above three-year college	0.00258 (-0.0511, 0.0563)	0.0274	0.00225 (-0.0515, 0.0560)	0.0274
Married	-0.00965 (-0.0451, 0.0258)	0.0181	-0.00807 (-0.0436, 0.0274)	0.0181
Urban residency	-0.1210** (-0.1480, -0.0938)	0.0138	-0.1200** (-0.1470, -0.0933)	0.0138

Table 2. Continued

Variable	Model 1			Model 2	
	(i)		(ii)	(iii)	(iv)
	Coefficient (95% CI)		SE	Coefficient (95% CI)	SE
Medical insurance					
GMI	-0.0157 (-0.1030, 0.0721)		0.0448	-0.0124 (-0.1000, 0.0753)	0.0448
UEMI	0.0563* (0.0029, 0.1100)		0.0273	0.0576* (0.0042, 0.1110)	0.0273
URMI	0.0510 (-0.0062, 0.1080)		0.0292	0.0524 (-0.0048, 0.1100)	0.0292
NRCMI	0.1220** (0.0790, 0.1650)		0.0219	0.1220** (0.0794, 0.1650)	0.0219
SI	0.1030 (-0.0777, 0.2840)		0.0923	0.1050 (-0.0758, 0.2860)	0.0923
NoI	Ref.			Ref.	
Household income	0.00140 (-0.00026, 0.00306)		0.00085	0.00142 (-0.00024, 0.00308)	0.00085
Employment					
Agricultural	0.0929** (0.0575, 0.1280)		0.0181	0.0923** (0.0569, 0.128)	0.0181
Waged	-0.0582** (-0.0928, -0.0236)		0.0177	-0.0620** (-0.0966, -0.0274)	0.0176
Self-employed	-0.1160** (-0.1650, -0.0665)		0.0251	-0.1180** (-0.1670, -0.0688)	0.0251
Other	Ref.			Ref.	
Health status					
Poor	-0.0061 (-0.0508, 0.0387)		0.0228	-0.0071 (-0.0519, 0.0376)	0.0228
Fair	Ref.			Ref.	
Good	0.1090** (0.0725, 0.1450)		0.0184	0.1070** (0.0711, 0.1430)	0.0184
Smoking-related chronic diseases	-0.0224 (-0.0571, 0.0123)		0.0177	-0.0212 (-0.0559, 0.0135)	0.0177
Drinking	-0.0396* (-0.0751, -0.0041)		0.0181	-0.0396* (-0.0751, 0.0040)	0.0181
Healthcare utilization	0.0478* (0.0107, 0.0848)		0.0189	0.0479* (0.0109, 0.0849)	0.0189
Number of observations	29500			29500	

** Statistical significance at 1% level, * Statistical significance at 5% level.

Table 2 shows the results of smoking status and pack-years affecting trust in physicians. The coefficient estimates for Model 1 are shown in column (i) of Table 2 for the categories of smoking status. When the individual was a current smoker, he/she would be more likely to rate his/her trust in physicians lower than a never smoker (Coefficient = -0.0609; 95% CI: -0.0938, -0.0280). Ex-smokers were more likely to rate trust in physicians higher than never smokers, but not statistically significant (Coefficient = 0.0470; 95% CI: -0.0334, 0.1280). The coefficient estimates for Model 2 are shown in column (iii) of Table 2 for pack-years categories. More cigarette smoking, measured in pack-years, was associated with decreased trust in physicians (Coefficient = -0.000974; 95% CI: -0.001510, -0.000439).

Table 3 shows the results of smoking status and pack-years affecting satisfaction with the health system. Column (i) reports the coefficient estimates for Model 1 in which smoking-status variables are included. Individuals who currently smoke cigarettes were less likely to rate greater satisfaction with the health system compared with those who never smoked (Coefficient = -0.0737; 95% CI: -0.1060, -0.0405). Column (iii) reports the coefficient estimates for Model 2 in which pack-years are included. More cigarette smoking, measured in pack-years, was associated with lower satisfaction with the health system, but not statistically significant (Coefficient = 0.000122; 95% CI: -0.000415, 0.000659).

Table 4 presents the results of the average marginal effects of smoking status on trust in physicians and satisfaction with the health system. Trust in physicians or satisfaction with the health system had a significant negative coefficient concerning current smokers, i.e. current smokers were less likely to rate complete trust in physicians compared to those who never smoked. Moreover, current smokers were less likely to rate

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Table 3. Ordered probit regression analysis on satisfaction with the health system

Variable	Model 1		Model 2	
	(i)	(ii)	(iii)	(iv)
	Coefficient (95% CI)	SE	Coefficient (95% CI)	SE
Smoking status				
Current smoker	–0.0737** (–0.1060, –0.0405)	0.0169	–	
Ex-smoker	–0.0334 (–0.1140, 0.0477)	0.0414	–	
Never smoker	Ref.		–	
Pack-years	–		0.000122 (–0.000415, 0.000659)	0.000274
Age				
15–24	Ref.		Ref.	
25–64	–0.1940** (–0.2430, –0.1440)	0.0252	–0.2030** (–0.2520, –0.1530)	0.0252
≥65	0.00724 (–0.0500, 0.0645)	0.0292	0.000886 (–0.0566, 0.0583)	0.0293
Male	0.0908** (0.0599, 0.1220)	0.0157	0.0513** (0.0236, 0.0789)	0.0141
Educational level				
Illiterate	Ref.		Ref.	
Elementary school	–0.1220** (–0.1600, –0.0843)	0.0193	–0.1210** (–0.1590, –0.0833)	0.0193
Middle school	–0.2180** (–0.2550, –0.1810)	0.0192	–0.2160** (–0.2530, –0.1780)	0.0192
High school	–0.3240** (–0.3700, –0.2790)	0.0232	–0.3210** (–0.3670, –0.2760)	0.0233
Above three-year college	–0.4380** (–0.4920, –0.3830)	0.0278	–0.4290** (–0.4840, –0.3750)	0.0278
Married	–0.0027 (–0.0385, 0.0330)	0.0182	–0.0019 (–0.0377, 0.0338)	0.0182
Urban residency	–0.0126 (–0.0399, 0.0146)	0.0139	–0.0122 (–0.0395, 0.0150)	0.0139
Medical insurance				
GMI	–0.0529 (–0.142, 0.0365)	0.0456	–0.0510 (–0.140, 0.0383)	0.0456
UEMI	–0.0618* (–0.1160, –0.0076)	0.0276	–0.0608* (–0.1150, –0.0066)	0.0276
URMI	–0.0085 (–0.0664, 0.0494)	0.0295	–0.0092 (–0.0671, 0.0487)	0.0295
NRCMI	0.0252 (–0.0182, 0.0685)	0.0221	0.0250 (–0.0183, 0.0684)	0.0221
SI	0.0121 (–0.1700, 0.1950)	0.0931	0.0131 (–0.1690, 0.1960)	0.0931
NoI	Ref.		Ref.	
Household income	0.00126 (–0.00042, 0.00295)	0.00086	0.00130 (–0.00038, 0.00299)	0.00086
Employment				
Agricultural	0.0350 (–0.000469, 0.0704)	0.0181	0.0322 (–0.00324, 0.0676)	0.0181
Waged	–0.0699** (–0.1050, –0.0350)	0.0178	–0.0741** (–0.1090, –0.0392)	0.0178
Self-employed	–0.1070** (–0.1570, –0.0570)	0.0255	–0.1090** (–0.1590, –0.0588)	0.0254
Other	Ref.		Ref.	
Health status				
Poor	–0.1210** (–0.1660, –0.0759)	0.0230	–0.1210** (–0.1660, –0.0759)	0.0230
Fair	Ref.		Ref.	
Good	–0.0321 (–0.0683, 0.0042)	0.0185	–0.0329 (–0.0691, 0.0034)	0.0185
Smoking-related chronic diseases	0.0040 (–0.0308, 0.0389)	0.0178	0.00518 (–0.0297, 0.0400)	0.0178
Drinking	0.0299 (–0.0059, 0.0658)	0.0183	0.0197 (–0.0162, 0.0556)	0.0183
Healthcare utilization	0.0337 (–0.0034, 0.0709)	0.0190	0.0351 (–0.0021, 0.0722)	0.0190
Number of observations	29500		29500	

** Statistical significance at 1% level, * Statistical significance at 5% level

Table 4. Estimated marginal effect of smoking status on trust in physicians and satisfaction with the health system

Smoking status	Trust in physicians	Marginal effect (95% CI)	Satisfaction with the health system	Marginal effect (95% CI)
Current smoker	Completely trustworthy	−0.0146** (−0.0223, −0.00681)	Completely satisfied	−0.00547** (−0.00788, −0.00306)
Ex-smoker	Completely trustworthy	0.0117 (−0.00872, 0.0321)	Completely satisfied	−0.00247 (−0.00831, 0.00337)
Never smoker	Ref.		Ref.	

Adjusted for age, sex, educational level, marital status, urban residency, medical insurance, household income, employment, self-rated health, smoking-related chronic diseases, drinking, and healthcare utilization. ** Statistical significance at 1% level.

completely satisfied with the health system than never smokers. In particular, ex-smokers were more likely to rate complete trust in physicians than never smokers, but not statistically significant.

DISCUSSION

To the best of our knowledge, this is the first report on trust in physicians and satisfaction with the health system among Chinese smokers. The current study found that, in general, current smokers had a low level of trust in physicians. Current smokers would be more likely to rate trust in physicians lower than never smokers. Trust in physicians is the optimistic acceptance of a vulnerable situation in which the patient believes that the physician will act in the patient's best interest[19]. Previous studies indicated that health issues, functional decline, and premature mortality are strongly related to smoking[20,21]. Considering the profound vulnerability created by smoking-related disease and mortality, the greater the sense of vulnerability, the greater the potential for either trust or distrust[19]. Smoking is associated with higher healthcare utilization by current smokers than those who never smoked[22,23]. Smoking patients may be more likely to stay with the practice and continue to see the same physician and thus have more continuity. Sufficient continuity with the same physician to allow for the establishment of a positive relationship between patient and physician, may help to improve trust[24]. However, profound vulnerability may also give rise to distrust in physicians[25,26]. Smoking is linked with worse health conditions[2]. Persons in the worse health conditions are more likely to have negative experiences in healthcare and be less satisfied with it[11]. Alternatively, worse health conditions may cause depressive symptoms or other negative feelings that

cloud evaluations of trust in physicians[19]. Moreover, this study found that more cigarette smoking was associated with lower trust in physicians. Ever smokers with more pack-years have increased incidence of smoking-related disease[27]. More pack-years come with a greater sense of vulnerability and, therefore, more cigarette smoking creates higher distrust.

The present study also found that current smokers were less likely to rate greater satisfaction with the health system than never smokers. Individuals assess the health system on the basis of health outcomes. When the health system underperforms to produce inadequate health outcomes for whatever reason, satisfaction will decrease[28]. Previous studies have reported that current smokers are more likely to report their health as poor or very poor than never smokers[21,29,30]. Individuals who report being in poor or very poor health are less likely to be satisfied with the health system[31].

Trust in physicians is decisive in patients' willingness to seek care, reveal sensitive information, submit to treatment, adhere to treatment plans, remain with a physician, and recommend physicians to others[19,32]. There are more than 800 smoking cessation clinics in China. However, 5.6% of current smokers planned to quit smoking within one month in 2018, and only 1–2 patients per week per hospital sought assistance from these cessation clinics[1,33]. Lack of knowledge about the health hazards of tobacco and the absence of physician's advice on smoking cession contribute to the low cessation rates in China[33]. Patients with higher trust in physicians are significantly more likely to understand smoking-related health problems and engage in smoking cessation[24]. This result may have significant implications for regaining trust in physicians by smokers. A trusting relationship between physician and smoker should be established

before introducing smoking-related health problems and smoking cessation advice.

Trust looks forward, an expectation of future behavior, while satisfaction looks backward grounded on past experience[24]. Satisfaction with the health system has identified ways to improve health, reduce costs, and implement reform[21]. Current smokers had a relatively low level of satisfaction with the health system, and this result may have important implications for supporting health-system reform for tobacco treatment. First, the Chinese government should integrate tobacco dependence diagnosis, treatment, and monitoring, into the primary health system. Second, the medical insurance plans in China should consider covering smoking cessation treatment.

Limitations

Our study has some limitations. First, self-reported smoking status has been used in this study, and thus shares the limitations of all self-reported data: recall bias and unreliability of responses under pressure. Moreover, self-reported daily and occasional smoking data are unavailable in the CFPS. This study used pack-years to measure an individual's exposure to tobacco. Furthermore, we could not exclude ex-smokers who quit smoking in the past 30 days from the group of current smokers. Second, the question concerning trust in physicians or satisfaction with the health system was in our study a single question on an 11-point Likert scale. If respondents lack knowledge about the trust or satisfaction question, the responses may be inaccurate. Third, although the current study adjusted for a wide variety of control variables, it is possible that unknown or unmeasured confounders may explain the current findings.

CONCLUSIONS

Current smokers had a low level of trust in physicians and low satisfaction with the health system. Current smokers were less likely to have a higher trust in physicians and satisfaction with the health system than never smokers. These results may have important implications for regaining trust in physicians from smokers and supporting health-system reform for tobacco treatment.

REFERENCES

1. China Center for Disease Control and Prevention. China Adult Tobacco Survey. China Center for Disease Control and Prevention; 2019. http://www.chinacdc.cn/jkzt/sthd_3844/slhd_4156/201908/t20190814_204616.html. Accessed September 21, 2020.

2. Das SK. Harmful health effects of cigarette smoking. Mol Cell Biochem. 2003;253(1-2):159-165. doi:10.1023/a:1026024829294

3. Westmaas JL, Bontemps-Jones J, Bauer JE. Social support in smoking cessation: reconciling theory and evidence. Nicotine Tob Res. 2010;12(7):695-707. doi:10.1093/ntr/ntq077

4. Baldwin AS, Rothman AJ, Hertel AW, et al. Specifying the determinants of the initiation and maintenance of behavior change: an examination of self-efficacy, satisfaction, and smoking cessation. Health Psychol. 2006;25(5):626. doi:10.1037/0278-6133.25.5.626

5. Ostertag S, Wright BRE, Broadhead RS, Altice FL. Trust and other characteristics associated with health care utilization by injection drug users. J Drug Issues. 2006;36(4):953-974. doi:10.1177/002204260603600409

6. Musa D, Schulz R, Harris R, Silverman M, Thomas SB. Trust in the health care system and the use of preventive health services by older black and white adults. Am J Public Health. 2009;99(7):1293-1299. doi:10.2105/AJPH.2007.123927

7. Weingarten SR, Stone E, Green A, et al. A study of patient satisfaction and adherence to preventive care practice guidelines. Am J Med. 1995;99(6):590-596. doi:10.1016/s0002-9343(99)80243-5

8. Nelms E, Wang L, Pennell M, et al. Trust in Physicians Among Rural Medicaid-Enrolled Smokers. J Rural Health. 2014;30(2):214-220. doi:10.1111/jrh.12046

9. Benton JZ, Lodh A, Watson AM, et al. The association between physician trust and smoking cessation: Implications for motivational interviewing. Prev Med. 2020;135:106075. doi:10.1016/j.ypmed.2020.106075

10. Doescher MP, Saver BG, Franks P, Fiscella K. Racial and ethnic disparities in perceptions of physician style and trust. Arch Fam Med. 2000;9(10). doi:10.1001/archfami.9.10.1156

11. Kim AM, Bae J, Kang S, Kim YY, Lee JS. Patient factors that affect trust in physicians: a cross-sectional study. BMC Fam Pract. 2018;19(1). doi:10.1186/s12875-018-0875-6

12. Finney Rutten LJ, Blake K, Hesse BW, Ackerson LK. Isolated and skeptical: social engagement and trust in information sources among smokers. J Cancer Educ. 2011;26(3):465-473. doi:10.1007/s13187-011-0201-7

13. Fong RL, Bertakis KD, Franks P. Association between obesity and patient satisfaction. Obesity. 2006;14(8):1402-1411. doi:10.1038/oby.2006.159

14. Conroy MB, Majchrzak N, Regan S, Silverman C, Schneider L, Rigotti N. The association between patient-reported receipt of tobacco intervention at a primary care visit and smokers' satisfaction with their health care. Nicotine Tob Res. 2005;7 Suppl 1:S29-S34. doi:10.1080/14622200500078063

15. Solberg LI, Boyle RG, Davidson G, Magnan SJ, Carlson CL. Patient satisfaction and discussion of smoking cessation

during clinical visits. Mayo Clin Proc. 2001;76(2):138-143. doi:10.1016/S0025-6196(11)63119-4

16. Xie Y, Hu J. An introduction to the China family panel studies (CFPS). Chin Sociol Rev. 2014;47:3-29. doi:10.2753/CSA2162-0555470101.2014.11082908

17. Xie Y, Lu P. The sampling design of the China family panel studies (CFPS). Chin J Sociol. 2015;1(4):471-484. doi:10.1177/2057150X15614535

18. Ta Y, Zhu Y, Fu H. Trends in access to health services, financial protection and satisfaction between 2010 and 2016: Has China achieved the goals of its health system reform?. Soc Sci Med. 2020;245:112715. doi:10.1016/j.socscimed.2019.112715

19. Hall MA, Dugan E, Zheng B, Mishra AK. Trust in physicians and medical institutions: what is it, can it be measured, and does it matter?. Milbank Q. 2001;79(4):613-639. doi:10.1111/1468-0009.00223

20. Thun MJ, Myers DG, Day-Lally K, et al. Age and the exposure-response relationships between cigarette smoking and premature death in Cancer Prevention Study II. In: Monograph 8: Changes in Cigarette-Related Disease Risks and Their Implications for Prevention and Control. Bethesda, Maryland: National Cancer Institute; 1997:383-413

21. Manderbacka K, Lundberg O, Martikainen P. Do risk factors and health behaviours contribute to self-ratings of health?. Soc Sci Med. 1999;48(12):1713-1720. doi:10.1016/s0277-9536(99)00068-4

22. Kahende JW, Adhikari B, Maurice E, Rock V, Malarcher A. Disparities in health care utilization by smoking status–NHANES 1999-2004. Int J Environ Res Public Health. 2009;6(3):1095-1106. doi:10.3390/ijerph6031095

23. Li C, Fan Y, Supakankunti S. The impact of cigarette smoking on healthcare utilization among rural residents in China. J Subst Use. 2018;23(6):626-633. doi:10.1080/14659891.2018.1489004

24. Thom DH, Hall MA, Pawlson LG. Measuring patients' trust in physicians when assessing quality of care. Health Aff (Millwood). 2004;23(4):124-132. doi:10.1377/hlthaff.23.4.124

25. Ethics, trust, and the professions: philosophical and cultural aspects. Pellegrino ED, Veatch RM, Langan J, eds. Georgetown University Press; 1991.

26. Shenolikar RA, Balkrishnan R, Hall MA. How patient-physician encounters in critical medical situations affect trust: results of a national survey. BMC Health Serv Res. 2004;4. doi:10.1186/1472-6963-4-24

27. U.S. Department of Health and Human Services. The Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.

28. Kotzian P. Determinants of satisfaction with health care system. The Open Political Science Journal. 2009;2(1).

doi:10.2174/1874949600902010047

29. Ho SY, Lam TH, Fielding R, Janus ED. Smoking and perceived health in Hong Kong Chinese. Soc Sci Med. 2003;57(9):1761-1770. doi:10.1016/s0277-9536(03)00021-2

30. Nakata A, Takahashi M, Swanson NG, Ikeda T, Hojou M. Active cigarette smoking, secondhand smoke exposure at work and home, and self-rated health. Public Health. 2009;123(10):650-656. doi:10.1016/j.puhe.2009.09.006

31. Bleich SN, Özaltin E, Murray CJL. How does satisfaction with the health-care system relate to patient experience?. Bull World Health Organ. 2009;87(4):271-278. doi:10.2471/BLT.07.050401

32. Hall MA, Camacho F, Dugan E, Balkrishnan R. Trust in the medical profession: conceptual and measurement issues. Health Serv Res. 2002;37(5):1419-1439. doi:10.1111/1475-6773.01070

33. Yang G, Wang Y, Wu Y, Yang J, Wan X. The road to effective tobacco control in China. Lancet. 2015;385(9972):1019-1028. doi:10.1016/S0140-6736(15)60174-X